

THE

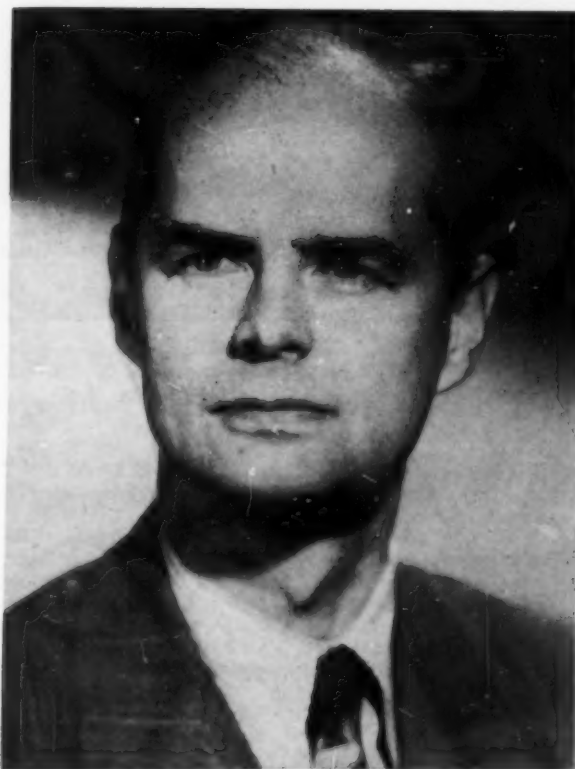
December, 1959

# CHEMIST

VOLUME XXXVI



NUMBER 12



**Dr. Johan A. Bjorksten, F.A.I.C.**  
Receives Honor Scroll of Chicago AIC Chapter  
(See page 437)



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Vol. XXXVI

December, 1959

Number 12

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• • •

Deadlines for THE CHEMIST: For the January issue the deadline is December 15.

• • •

THE AMERICAN INSTITUTE OF CHEMISTS does not necessarily endorse any of the facts or opinions advanced in articles which appear in THE CHEMIST.

# All Best Wishes for Christmas!

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## TO COME IN JANUARY

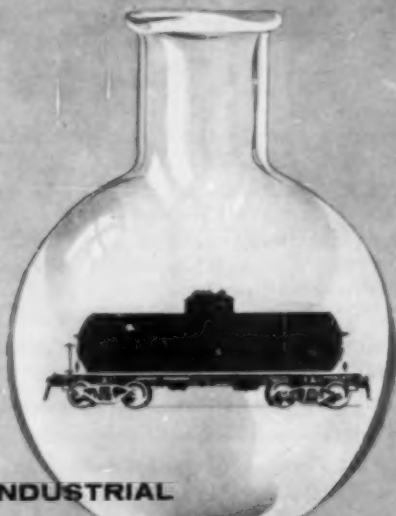
At the beginning of this New Year in our "atomic-space" age, Dr. Lincoln T. Work, Hon. AIC, former AIC president, presents a fine, thoughtful paper on "The Unchanging Aspects of Professionalism in a Changing World." . . . The new Department on "Current Legislation" will start in this issue. As much other professional material as space permits will appear.

## Recommended Suppliers and Services

J. T. Baker Chemical Co.	421	Phoenix Chemical Laboratories	464
Commercial Solvents Corp.	424	Robinette Research Laboratories	455
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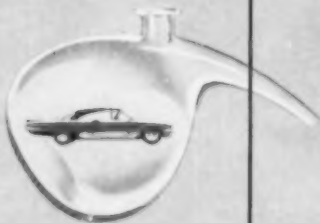


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## EDITORIAL

# Taxation Should Be Fair and Equal

Dr. Wayne E. Kuhn, F.A.I.C.

*AIC President*

**T**HIS country and our profession has been built on a strong steady growth of free enterprises and on the honorable conduct of our affairs, particularly our professional activities. Our Code of Ethics stresses fairness in business enterprises and emphasizes proper fees for professional work.

Let us not blissfully dismiss the thought that fees for professional work have a bearing on only a few of our members. In one area it has a sinister connotation which arises through tax favoritism. Do we stand for or condone tax favoritism? Our Code certainly does not. Some of our brilliant state planners continue to support increased taxes in many areas and tax favoritism in others.

The National Association of Manufacturers has an adopted policy that meets the AIC Code. It is:

"Federal taxation of all competitive enterprise should be fair and equal, and no tax favoritism should be shown any competitive group, whether it be private, corporate, cooperative, or association.

"In particular the present tax laws should be changed so that the present unfair, inequitable and discriminatory distribution of tax burdens as between cooperative and non-cooperative enterprises will be eliminated."

This is not against taxation and we are not. It suggests to us a strong stand FOR constructive reform in

tax laws and tax administration.

Today nonprofit or not-for-profit laboratories sheltered by a tax-exemption blanket compete for and do commercial testing and consulting. Today legislation is under consideration giving state planners cognizance over certain fields of research in which the professional chemist is engaged.

Let us not ignore warning flags. Let us examine each new piece of legislation to be sure we are continuing our free enterprise system and the prestige of our profession. We quote William C. Newberg, executive vice president of Chrysler Corporation:

"Those who subscribe to the new school of economic Spartanism might be slightly shocked to be told that what they are saying plays right into the hands of those who would like to see more state planning and control.

"The way to finance more education, more defense, more research, more public health and other necessary services is to keep the *whole economy growing* as it has been growing."

The Society for Applied Spectroscopy will meet Jan. 5, 1960, at the New Yorker Hotel, New York, N. Y. Speaker: Dr. W. J. Youden, National Bureau of Standards, "Statistical Ideas Useful in Experimentation."



## Special AIC Announcements

### News About The Chemist

Two new departments for **THE CHEMIST** have been suggested by AIC President Kuhn:

(1) **Professional Reprints**

**Available**—to contain a listing of reprints (and where they may be obtained) on subjects that are within the scope of AIC interests. Suggestions are welcome from all AIC members about material of a professional nature for inclusion here. Please supply samples of the suggested material.

(2) **Current Legislation** —

where pertinent State and National legislation may be called to the attention of AIC members. Both the Committee on Legislation and individual AIC members can help to provide information for this department.

**THE CHEMIST** also welcomes a new contributing editor: Donald Slavin, M.A.I.C., chemist with Samuel P. Sadtler & Son, Inc., Philadelphia, Pa., whose college courses included journalism. He will serve as contributing editor from the Philadelphia Chapter.

### More Members for "The 200 Club"

"The 200 Club," composed of AIC members who will endeavor to bring in ten new members during the year, welcomes the following persons:

James M. Crowe, F.A.I.C.  
Dr. M. Frederick Hawthorne, F.A.I.C.  
Dr. Frederick A. Hessel, F.A.I.C.  
Frank W. Melcher, F.A.I.C.  
John F. Miller, M.A.I.C.  
Dr. John H. Nair, F.A.I.C.

Volunteers may send their names to the co-chairmen of the Membership

Committee: Dr. L. T. Eby, 1105 DeWitt Terrace, Linden, N. J.; Dr. John R. Bowman, Associate Dean, Engineering, The Technological Institute, Northwestern University, Evanston, Ill., or to the chairman of the Committee on New Chapters and Expansion, Martin B. Williams, 1013 Pratt Ave., N.E., Huntsville, Alabama.

### Florence Wall to be Honored

Honorary AIC Membership will be presented to Miss Florence E. Wall, AIC Charter and Life Member, consultant, New York, N. Y., at a meeting to be sponsored by the New York Chapter, January 7, 1960, at the Shelburne Hotel, New York, N. Y. Miss Wall is a former editor of **THE CHEMIST**, active on many committees, and presently chairman of our Committee on AIC History.

### Charter Presentation

The newly-formed Pittsburgh AIC Chapter will receive its Charter, December 4, at a meeting at Webster Hall, Pittsburgh, Pa. The guest speaker is Judge F. J. McKenna of the Court of Common Pleas. John Kotrady, AIC Secretary, will present the Charter.

### District Directors of Ohio Chapter

Dr. J. D. D'Ianni, chairman of the Ohio Chapter, announces the ap-



## AIC ANNOUNCEMENTS

pointment of the following District Directors to handle AIC activities in the local areas of the Chapter:

**Akron:** Anthony F. Finelli, 69 Westgay Drive, Akron 13, Ohio

**Cincinnati:** Elton S. Cook, 6503 Park Lane, Mariemont, Cincinnati 27, Ohio

**Cleveland:** J. H. Dollinger, Box

349, Bedford, Ohio

**Columbus:** E. L. Kropa, Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio

**Dayton:** Charles A. Dille, 393 West 1st St., Dayton 1, Ohio

**Director-at-Large:** Joseph B. Littman, Packard Electric Division, Warren, Ohio

## Your Marshal's Baton

**Richard L. Moore, F.A.I.C.**

*Public Relations Department, W. R. Grace & Co., New York 4, N. Y., and chairman, AIC Committee on Public Relations.*

**EVERYBODY** in the INSTITUTE has at least one friend and, no doubt, many more who would make good members of the INSTITUTE but have never joined because for one reason or another they were not approached when the iron was hot.

When we see George or Bill, we think to ourselves, or perhaps aloud, that they should join us and would undoubtedly be a credit to our ranks; but then we tend to forget about the matter until "the next time." I must confess that I have talked about the INSTITUTE to personal friends who have expressed interest and then have done nothing about it because of the press of "other things."

Recently the shoe was on the other foot. I had lunch with two associates who insisted that I become a member of their organization and promised to send me an application blank. They haven't as yet and I am sure I'm not going to ask them. In my opinion, most people want to be invited to

join a specific group such as ours.

Every member of the AIC really has to be a roving membership committee of one and should have a membership application handy to pass along when the time arises. Words alone are not enough; it takes action and follow-up too.

If every member brought in one new member this year we would be able to implement and strengthen many of our programs and objectives. It would be a truly wonderful thing to breathe new life into the INSTITUTE in this way. I am sure that each person reading this knows one and possibly many more people who would be happy to join the AIC, if only they knew they were wanted.

Why don't you carry an application blank in your briefcase wherever you go? Every new AIC member means one more link toward achieving greater professional stature for the INSTITUTE as a body and for all who are interested in seeing chemists

recognized as professional men.

May we send you a Marshall's Baton for your knapsack?

*Note:* A request to The American Institute of Chemists, 60 E. 42nd St., New York 17, N. Y., will bring you an application blank, a leaflet, and a statement of qualifications for membership.)

## Professional Appointments

**Dec. 1, 1959. Buffalo, N. Y.** Dining Room B, Norton Hall, University of Buffalo. Meeting of Niagara Chapter. Dinner 6:30 p.m. Meeting 8:00 p.m. Speaker: Dr. Roger L. Pilloton, Union Carbide Metals Co. Subject: "The European Common Market." For Reservation: Dr. J. F. Walker, P.O. Box 517, Niagara Falls, N. Y.

**Dec. 4, 1959. Pittsburgh, Pa.** Webster Hall Hotel. Charter Dinner meeting of the new Pittsburgh Chapter. John Kotrady, AIC secretary, will present the Charter. Speaker: Hon. J. Frank McKenna of the Court of Common Pleas. Subject, "The Responsibilities of the Professions." For information, Dr. Robert Freedman, Secretary, Pittsburgh AIC Chapter, Pittsburgh Consolidation Coal Co., Library, Pa.

**Dec. 8, 1959. New York, N. Y.** The Chemists' Club, 52 E. 41st St., New York 17, N. Y. Luncheon meeting of the AIC Board of Directors and National Council. Board meets at 12:00 noon; Council at 12:15.

**Dec. 8, 1959. Wilmington, Del.** Kent Manor Inn. Meeting of the Delaware Chapter. Social Hour: 6:15 p.m., Dinner 7:00 p.m. Speakers: Dr. William J. Sparks, Hon. AIC; Dr. Ivey Allen and A. M. Gessler, all of Esso Research & Engineering Co., Linden, N. J. Discussion Topic: "Back to the Laboratory." For information: Dr. S. D. Bruck, E. I. duPont de Nemours & Co., Experimental Station, Carothers Research Lab., Wilmington, Delaware.

**Dec. 9, 1959. Chicago, Ill.** Columbian Room, Henri's Restaurant, 71 West Randolph. Meeting of Chicago Chapter. Social hour, 6 p.m. Dinner 6:30 p.m. Ladies Night program. Speaker: Dr. Robert Johns, director, Illinois Commission of Higher Education. Subject:

"Higher Education in Illinois." Reservations (\$4.50): Miss Virginia Cronin, Universal Oil Products Co., Des Plaines, Ill. (Vanderbilt 4-1155).

**Dec. 10, 1959. Philadelphia, Pa.** Engineers' Club. Meeting of Philadelphia Chapter. Luncheon 12:00 noon. Topic and speaker to be announced.

**Dec. 15, 1959. New Brunswick, N. J.** Old Chemistry Building, Rutgers University Campus. Meeting of New Jersey Chapter. (Dinner 6:30 p.m. in Rutgers University Faculty Alumni Club, 199 College Ave., New Brunswick, N. J.) Meeting 8:00 p.m. Speaker: Dr. Charles G. Overberger, chairman, Department of Chemistry, Polytechnic Institute of Brooklyn. Subject: "A Course for Seniors and Graduate Students on the Profession of Chemistry." For reservations for the dinner: Dr. Gordon (FOXcroft 6-0701, ext. 5223); House Chairman Dr. Edgar E. Lineken (ELliott 6-2000), or Dr. Stephen E. Ulrich, Rutgers University (CHarter 7-1766). No reservations are necessary to attend the meeting only.

**Jan. 1960. Huntsville, Alabama.** Meeting of Alabama Chapter. Details to be announced. For information: Dr. Charles E. Feazel, Head, Applied Chemistry Div., Southern Research Institute, Birmingham 5, Ala., or Martin B. Williams, 1013 Pratt Ave., N.E., Huntsville, Ala.

**Jan. 7, 1960. New York, N. Y.** Shelburne Hotel. Meeting of New York Chapter. Presentation of Honorary AIC Membership to Florence E. Wall, F.A.I.C. All Charter Members of this area will be presented.

**Jan. 7, 1960. Pennsylvania.** Meeting of Philadelphia Chapter. Honor Scroll to be presented to Dr. R. A. Dutcher, of Pennsylvania State University, University Park, Pa. Topic and location to be announced.

**Jan. 15, 1960. Minneapolis, Minn.** Meeting of Twin City Chapter. Honor Scroll Award. For information: Dr. Joseph F. Abere, Minn. Mining & Mfg. Co., 2301 Hudson Rd., St. Paul 6, Minn.

**Feb. 1960. Birmingham, Alabama.** Meeting of Alabama Chapter. Details to be announced. For information: Dr. Charles E. Feazel, Head, Applied Chemistry Div., Southern Research In-

## PROFESSIONAL APPOINTMENTS

stitute, Birmingham 5, Ala., or Martin B. Williams, 1013 Pratt Ave., N.E., Huntsville, Ala.

**Feb. 2, 1960. Buffalo, N. Y.** Meeting of Niagara Chapter. For information: Dr. J. Frederic Walker, AIC Program Chairman, P.O. Box 517, Niagara Falls, N. Y.

**Feb. 2, 1960. Wilmington, Delaware.** Kent Manor Inn. Meeting of Delaware Chapter. Social hour, 6:15 p.m. Dinner 7:00 p.m. Speaker Dr. Ivor Griffith, F.A.I.C., president, Philadelphia College of Pharmacy & Science, Philadelphia 4, Pa. For information, Dr. Stephen D. Bruck, E. I. du Pont de Nemours & Co., Inc., Experimental Sta., Carothers Research Lab., Wilmington, Del.

**Feb. 11, 1960. Philadelphia, Pa.** Engineers' Club. Luncheon meeting of Philadelphia Chapter. 12:15 p.m. Speaker: Carl Setterstrom, F.A.I.C., Anison Corporation. Topic: "The Chemist in Commercial Development." Luncheon reservations should be made by Feb. 9, with Dr. E. M. Kipp, Foote Mineral Co., Berwyn, Pa. (Niagara 4-6800).

**May 11-13, 1960. Minneapolis, Minn.** Radisson Hotel. 37th Annual AIC Meeting. The Twin City Chapter will be our host.

**June, 1960.** (Day to be announced.) **Minneapolis, Minn.** Meeting of Twin City Chapter. Award of student medals. For information: Dr. Joseph F. Abere, Minn. Mining & Mfg. Co., 2301 Hudson Rd., St. Paul 6, Minn.

**May 11-12, 1961. Washington, D. C.** Statler Hotel. 38th Annual AIC Meeting. The Washington Chapter will be our Host.

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The School of Engineering of Columbia University announces an evening course (Spring term) in "Passive Element Analog Computers — M.E. 234." For information: Prof. V. Paschkis, Room 624 Engineering Bldg., Columbia University, New York, N. Y.

The 126th Meeting of the American Association for the Advancement of Science will be held at the Hotel Morrison, Chicago, Ill., December 26-31, inclusive.

**Dr. L. W. Seigle, F.A.I.C.**, has been appointed assistant to the director of chemical sales for the National Aniline Division of Allied Chemical, New York 6, N. Y.

## Report of the Committee on Professional Education Minutes of Meeting held September 14, 1959

The Committee met in Atlantic City, at Convention Hall, at 10:30 a.m. The entire personnel of the committee, including Dr. John R. Bowman, Dr. D. B. Keyes, Dr. C. G. Overberger, Dr. L. H. Reyerson, G. A. Zerlaut, and K. M. Herstein, chairman, were present.

The following persons joined the meeting and participated in its discussions: Dr. E. J. Durham, Dr. Walter Guthmann, Dr. J. H. Hildebrand, and Dr. W. E. Kuhn.

The Chairman summarized briefly the activities of the committee during the past year, which were devoted largely to the analysis of curricula at various high schools. The data on which the analysis was based were furnished by cooperating members of the INSTITUTE. During the coming year efforts will be made to broaden the scope of the survey.

In addition, the Chairman had opened correspondence with Dr. James E. Allen, Commissioner of Education in the State of New York, relative to a survey ordered by the Governor of the State, to cover all aspects of public education in the State. A reply from Commissioner Allen was read, indicating an offer to meet with the committee for discussion. The Chairman was authorized to make arrangements for such a meeting.

Drs. Bowman and Guthmann suggested that the committee should direct its efforts to college level education. The Chairman pointed out that nothing was wrong with college level education which could not be cured by more adequate education from the primary grade up. Dr. Hildebrand suggested that pertinent material was contained in "Preliminary Report of the Joint Commission on Education," which can be obtained by writing to the Joint Commission on Education, State Capitol, Sacramento, California.

Other matters raised during the discussion were the rising tide of professional unionism, and the lack of indoctrination in professionalism which characterizes most entrants into the profession.

The following actions were approved for the coming year:

(1) Distribution of the AIC Code of Ethics as widely as possible among col-

lege teachers of chemistry, deans, and student advisers.

(2) An effort to have Education committees appointed in every Chapter of the AIC to implement and increase the committee's activities.

(3) To stimulate discussions in AIC Chapters on the question, "What is the most important thing that you can do to help your college solve its problems."

(4) To urge Chapter chairmen and AIC members to reestablish contact with local colleges to spread the message of professionalism to department chairmen, chemistry faculties, and student groups.

(5) To prepare an outline for a talk on professionalism which may be given to student groups.

—Gene A. Zerlaut, M.A.I.C.  
Secretary pro tem.

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# The Professional Chemist in Industry

Dr. E. M. Kipp, F.A.I.C.

*Director of Research, Foote Mineral Company, Philadelphia 44, Pa.*

(Presented at the Students' Award Night meeting of the Pennsylvania AIC Chapter, May 14, 1959, at the Engineers Club, Philadelphia, Pa.)

OUR college and university students are infrequently given a realistic appreciation of the distinguishing features of industrial research. The competition for outstanding young minds and personalities has often resulted in a glamorized portrayal of industrial research. This frequently brings a period of unnecessary, and sometimes permanent, disillusionment and frustration to the new employee, to the detriment of both the man and the company.

As anyone can testify, who has had occasion to participate in recruitment of technical personnel, heavy emphasis is often placed upon the physical and material aspects of the industrial research organization involved, such as the increasing emphasis upon glamorized research centers and generous supporting facilities; salaries and fringe benefits, and job security. Many well known and respected companies emphasize that their scientists travel and lodge first class; enjoy generous expense accounts for meals and personal entertainment; and will bask in the reflected prestige of a top name company.

I am not against these things; quite the contrary! However, I suggest that the emphasis upon these aspects of industrial research, to the relative exclusion of fundamental

considerations of job challenge content, and policy environment, frequently results in a distorted picture in the mind of the prospective employee. Adequate discussions and appraisals of the many other factors which will determine whether the proposed association is to be a long and mutually fruitful and satisfying one are thus purposely or by default given only superficial consideration.

The two major areas of the professional chemist in industry are the general nature of industrial research and the characteristics of the individual scientist. I shall touch but briefly upon some of the more prominent factors in each area, hoping that I may convey a reasonably helpful and realistic portrayal of the subject.

## Industrial Research

The first thing to appreciate and accept about industrial research is that over a greater or lesser period of time it must be a money making activity. The yardstick used to determine the profitability, if any, of industrial research and the period of time allocated in determining how soon and to what extent research should be demonstrably profitable will vary with the nature of the business, the competition, the objectives, size and resources of the company, the company policies on R & D,

and factors such as national or international business, political climates, and the like. This aspect is critical because it will to a large degree determine the extent to which the industrial research program will range from that of a routine "fire brigade" service organization to that, at the other extreme, of a research program in which the individual research chemists can, for all practical purposes, select and pursue their own projects and interests within broad areas and with a minimum of control and justification.

In any event, one of the important factors in industrial research, as contrasted perhaps to that of academic research, is to be found in the fact that in industrial research, the research scientist must expect and accept that several, if not many, persons will have a strong voice, directly or indirectly, in what he does, when he does it, and how he does it. Significant latitude in selection or originating of research projects is extended only to well proven and outstanding individuals under special circumstances, in the majority of industrial research laboratories.

A second important characteristic of industrial research is that final decisions in the selection, financing, and control of research projects and assignments are often vested in the hands of executives who may or may not have technical training, and who frequently, if technically trained,

may be laymen in the particular field of technology involved.

The practical implication of this situation is that the industrial research scientist must learn to be an articulate, albeit judicious salesman and promoter of projects, ideas, and knowledge without at any time knowingly distorting the facts or compromising objective evaluation and interpretation. This is frequently one of the most serious problems in the indoctrination of young scientists into the industrial research environment.

As scientists we are trained to get the facts. In this we acquire a belief, therefore, that the facts should speak for themselves. It is only with the maturing wisdom of passing years that we realize that what to us are facts may not be accepted as such by others. It does no good to resent this situation. The successful industrial research scientist will accept the problem and will become increasingly able and skilled in the art of productive communications.

Another distinguishing characteristic of industrial research is that of the pressures which are all too often brought to bear for quick results under unrealistic time, manpower, and budget limitations. There is a continuing and honest controversy as to the role to be played by R & D in the realistic handling or resolution of these problems. Many of our leading and most successful industrial research organizations are becoming



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increasingly aware that the research team can best determine the realistic levels for these factors, provided they are kept adequately informed by company management of the pertinent aspects of company objectives, resources, problems, goals and policies.

Still another distinguishing characteristic of industrial research and development is to be found in the close interdependence between the R & D functions and activities and other departments of the company in the profitable exploitation of R & D output. Extremely close and understanding collaboration under conditions of sincere good will and mutual respect between R & D, Market Development, Sales, Production, etc., must exist. Unless this collaboration is in evidence, R & D may, in fact, be doing an outstanding job of research and development but without contributing adequately to company growth or protection of the company's position. Under such circumstances it is most difficult without skilled, highly trained, competent management to diagnose the problem in order to take effective, corrective action. It is in this complicated area that many of the frustrations arise which destroy incentive and job satisfaction for the scientist in industrial research.

The foregoing factors are perhaps those which might quite often be discouraging to the prospective industrial research scientist. On the posi-

tive side, there are many advantages to industrial research. Salaries are, in general, considerably higher, at least initially, than in the academic field or in government research. Physical facilities, including the working tools for research, are generally provided in adequate abundance. Many, if not most, of the modern industrial research laboratories provide supporting services to relieve the creative scientist of as much routine as possible.

For example, analytical services, machine shop facilities, secretarial assistance, etc., are available if needed. Another important plus is the challenge of applying our research abilities to the solution of practical problems with benefit to the standard of living of the nation. Most progressive industrial research laboratories are generous in underwriting the expenses of their staff members for attending professional and technical society meetings and conventions. Because of this, and because of the interlocking nature of much of industrial research, there is broad opportunity for making friends and establishing contacts with a wide cross section of our nation's scientific population.

Last, but not least, there is the constant challenge of overcoming all kinds of problems and difficulties which are of direct concern to the company's competitive position and to its future growth and welfare. In

short, among the rewards for the successful industrial scientist is the opportunity for observing, at first hand, and having an active part in the forces determining the course of industry and commerce.

### **The Individual Research Scientist**

What are the personal and professional attributes which characterize the desirable industrial research chemist in the eyes of industry? These can be divided into two major classifications: (a) personal characteristics, (b) professional qualifications.

Discussion of personal characteristics is a complex task. Comments, therefore, must be extremely generalized. We in industry perhaps do not always really know and understand what we are looking for or what we want or should want for specific positions. Obviously, we want a person, if possible, who is personable, cooperative, constructive in his approach, and who has the excellent attributes of originality, creativity, ingenuity, and leadership. We also say he must get along well with people and be able when necessary to function effectively and with personal satisfaction as a team member and company man. It is a highly debatable question as to how many of these requirements are compatible. It is even more difficult to determine relative importance of each in a specific job. I would say that moral

integrity, mental honesty, and a high level of open-mindedness are primary requisites. The very nature of scientific research demands the ability and the will to understand the basis of his colleagues' contrasting or conflicting opinions or conclusions. He need not agree with them, but he should seek to understand them.

A good research scientist should not become easily discouraged. He should be enthusiastic about himself and his work. He should seek more often to discover reasons for action rather than to excel in the discovery of reasons for opposing fresh or new approaches. He should be well endowed with patience, but not at the cost of active perseverance. He should be able to accept criticism of his work and opposing opinions without reducing these to a personal basis and without looking upon them as criticisms of ability or competency. He should develop an appreciation and feel for business and market considerations as they may relate to the profitability of his research proposals. Above all, he should be humble enough to appreciate that he may be wrong even when he is most convinced that he is right, but again, without sacrificing these characteristics upon the altar of indecision.

Many industrial research organizations also attach considerable value to any aspects of a man's record which evidence leadership characteristics such as extracurricular activities. If

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a significant portion of college or graduate school expenses have been earned through part time jobs, this is also interpreted as evidence of a "go getter." In effect then, while technical competency is important it is not always the determining factor in itself. Finally, and perhaps most important, he should seek to understand and to know himself.

As for professional qualifications beyond the extent implied in the discussion of personal qualifications, we are primarily concerned, in the case of college graduates or advanced degree holders, with the academic record. Selection and nature of courses, grades and class standings are of primary importance. Evaluation of the student by professors is also carefully considered. In the case of college graduates any research projects undertaken by the student for extra credits or honors are important.

At the graduate degree level the thesis subject material and project are frequently considered as important indications of the probable effectiveness of the would-be industrial research scientist. Student membership in a professional society is also given considerable credit.

Again, as a generalization, there are two primary roads to professional growth in industrial research: (1) administrative and (2) technological. Which of these does he wish to follow and why? In either case, one of the greatest hazards facing the ag-

gressive and apprentice industrial research chemist is that of impatience. How soon does he have the right to expect to be promoted to director of research, and shortly thereafter, to executive vice president, president, and chairman of the board? Even at the well advanced and ripe age of 40, a man still has 20 to 30 years ahead of him. The research scientist must learn to accept the fact that with few exceptions there is no substitute for experience in transmutation of knowledge into the priceless asset of mature wisdom.

With reference to the career which the new professional chemist in industry may desire, frequently there has been inadequate knowledge and understanding of the alternative choices of careers in the industrial research field. Therefore, it is recommended that the industrial research chemist acquaint himself as thoroughly as possible with activities, responsibilities and other job-defining factors which go to make up a career in management; or a career in non-administrative industrial research, to mention but two contrasting alternatives. The industrial research scientist must then attempt to relate these requirements as effectively as possible to his own personal and professional assets and/or liabilities.

One of the most relevant and embarrassing questions which can be asked of an aspiring young chemist is, "What would you like to be

doing within the next 5, 10, 15, or 20 years? Why would you like to be doing it, and why do you believe yourself qualified to seek attainment of these careers?" It is a rare case where a coherent and well considered reply can be obtained. Admittedly, this is not necessarily the sole or even major fault of the man. Realization of this fact is one of the primary reasons for the increasing attention being devoted in our progressive research laboratories to the question of management and job training programs.

In short, perhaps the essence of the problem of the professional chemist in industry is to be found in the common everyday factors, character-

izing many jobs other than those of industrial research alone, such as the relative values placed by the individual person on factors of pay, challenge, personal associations, security, job content and objectives, etc. Any worthwhile job is composed largely of blood, sweat, tears, drudgery and a certain amount of good luck. If these requirements are acceptable and if the individual can maintain enthusiasm, a sense of proportion, and perseverance in the conduct of his job there will occur, from time to time, specific successes and achievements which will make the whole thing worthwhile and highly rewarding in many ways.

### The World of Thin Films

International Resistance Co., Philadelphia 8, Pa., recently revealed its new IRC *micro-Circuit*, a miniature electronic circuit of superior range, accuracy and ability to withstand environmental extremes, which was developed especially for the missile-borne computer program of the Arma Division of American Bosch-Arma Corporation.

Dr. John J. Bohrer, F.A.I.C., IRC director of research, showed how the bulky electronic equipment of the 1930's had been steadily reduced in size, until today a complete circuit of 18 components is incorporated into a wafer thin, 5/8-inch square, unit, achieved by making the passive components of the circuit out of thin

films of metals deposited on a tiny substrate of glass.

Dr. Sidney J. Stein, F.A.I.C., IRC director of research and engineering, said that the combined work of chemists, physicists, and engineers, is required in the electronics field. "Today it is impossible to divorce basic scientific work in chemistry and physics from electronics. The world of thin films is a 'never, never land,' a two-dimensional world, where the behavior of these thin metal films is quite different from what one might normally expect."

The 11th National Science Fair, sponsored by Science Service, Washington 6, D.C., will be held at Indianapolis, Ind., May 11-14, 1960.

# Aging — A Positive Approach

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(Presented when the author received the Honor Scroll of the Chicago AIC Chapter, Oct. 1, 1959, Chicago, Ill.)

ONE of the greatest problems which now confronts our profession is the problem of employment of chemists who have to change position after the age of 40 or 50. This should be of interest to everyone, for stripped to its essential, it can also be expressed as: Aging, how can we make the best of it, control, or possibly even reverse it?

A glance at the employment advertisements in the professional journals, or in the newspapers, or a talk with the employment agencies specializing in technical personnel, should suffice to convince anyone that this is a very real problem. While some nationally well known men have succeeded in favorably changing positions in advanced years, these are by no means the rule. While a case can be made for the desirability of employing older men on the basis of experience, maturity, and dependability, still more practical experience shows that the majority of employers give more weight to the greater speed and versatility of youth, and to the greater number of creative years ahead of the younger person.<sup>1</sup>

That there is a physiological base for this undesirable discrimination is shown by the following:

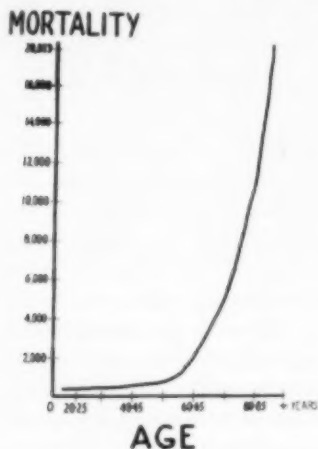
## TEST OF VERBAL FLUENCY<sup>2</sup>

<i>Age</i>	<i>Number of Subjects</i>	<i>Any Word</i>	<i>S.</i>	<i>Q.</i>
16-20	127	2.8	4.8	13.0
60-69 Control	43	8.2	12.4	27.3
60-69 Senile	27	10.9	17.1	48.0

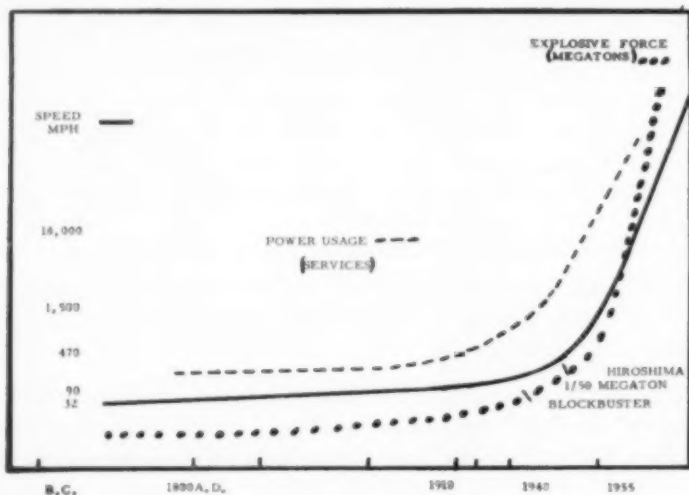
(Also, see Mortality Curve on next page).

If such results of physiological decline could be removed, the older men would have a great advantage. The problem of their finding employment would practically cease to exist.

To accomplish this would seem almost as large a task as conquering age and death itself, but any task seems difficult until it has been mastered. Later, when the job has been done, the solution seems so self-evident that we wonder why we did not see it right away.

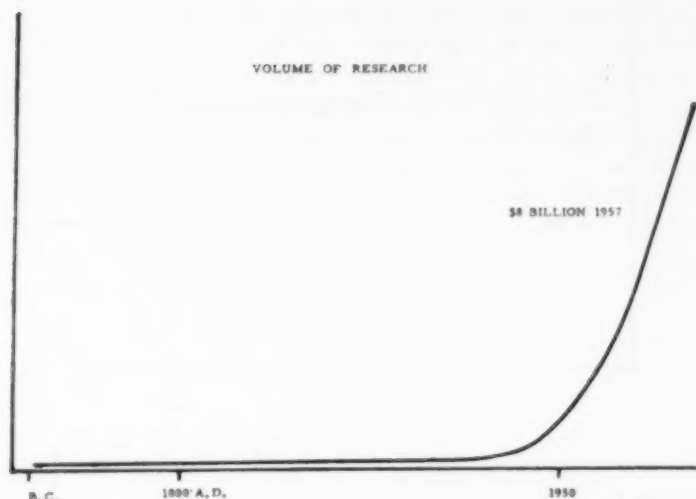
MORTALITY CURVE<sup>2</sup>

We live in the era of research successes. A glance at the curves of progress—borrowed from the paper "Collapse of Time" which Dr. J. L. Powell presented at one of our meetings<sup>3</sup> show how success has crowned every determined attempt to wrest power from knowledge of nature's laws.





## AGING — A POSITIVE APPROACH



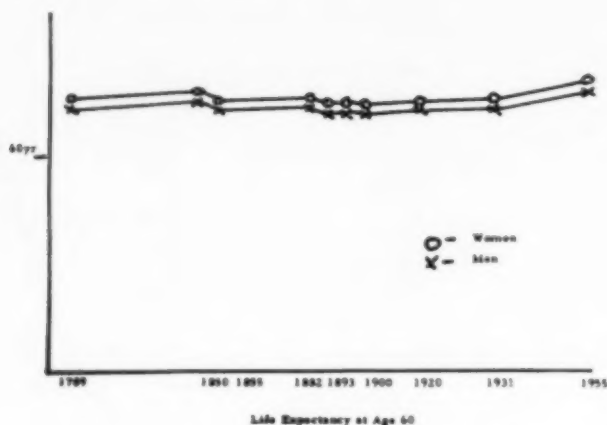
When we see how consistently success has followed determined effort, when we weigh the chances and probabilities in the light of the recent past, we may feel with the poet who said

"Today is nothing difficult, today will fortune squander,  
So let us then toward our fate with bold defiance wander.  
The higher our goal is set, the farther we'll be leading,  
We have the might of gods today, in all attempts succeeding." \*

Against this backdrop, let us consider the following statistics which depict life expectancy at age 60 from 1789 through 1955 (historical statistics of Metropolitan Life Insurance Company). The slight rise in the last decade can be ascribed to the use of antibiotics.

### LIFE EXPECTANCY AT AGE 60

	<i>Male</i>	<i>Female</i>
1789	14.8	16.1
1850	15.6	17.0
1855	14.4	15.6
1878-82	15.6	16.9
1890	14.7	15.7
1900-02	13.9	15.1
1909-11	13.4	14.8
1919-20	14.4	15.4
1929-31	14.3	15.8
1955	16.7	18.4



Why is it that virtually no progress has been made on the aging problem while major advances have been made in most other fields? In part, the answer is that no effort has been made to attack the aging problem in any really fundamental way. While substantial sums have been expended, this has been done in a haphazard way, in a multitude of small grants without any apparent central plan or purposeful direction.

In part, this may be because we all tend to take aging and death for granted as something unavoidable, and therefore worthy neither of study nor of concerted attack. In part it is because the normal sources of research funds consider this too big a problem for them to tackle so that any proposal of this scope is referred to the National Institutes of Health, and the Institutes concentrate work only on those problems for which there is a public pressure; in other words, uncontroversial problems on the major accepted diseases. In the face of public resignation, official apathy is understandable. The Institutes of Health use committees to screen their projects, and anyone of us who has dealt with committees knows how difficult it is to get them to approve risk research.

What then is the point of doing any work at all in an area where only the massive application of large resources is likely to effect the needed breakthrough? I like to think of this as a function of scouting, if you please, or of pump priming where even the small individual effort might serve a useful purpose. I shall tell you about such individual efforts, by others and myself, in the hope that perhaps someone present here might say the right word in

the right place and start this effort on the way to major support.

Twenty years ago I was chief chemist of Ditto, Inc., manufacturer of duplicating machines and supplies. Among other things we were working on hectograph gels, which are essentially gelatin-glycerin-water gels, hardened by the use of a very small amount of a cross-linking agent to make them more resistant to summer temperatures and humidities.

One day the plant manager called me and said, "What shall I do? I just found a weighing error—we put ten times too much cross-linking agent in a batch." The batch was several thousand pounds, but I had to say there was nothing we could do but scrap the rolls. With ten times too much cross-linker, it seemed certain that the gelatin mass on the rolls would soon be cross-linked to the point of losing all resiliency, would become a brittle, brown crust from which the liquid would ooze out as the ability to hold bound water or glycerin decreased.

Certain though I was that this would be the result, nonetheless I had a couple dozen rolls set aside for observation. Meanwhile, a few rolls had been shipped to a customer before there was time to stop this batch. This customer, a large insurance firm, soon came back and asked for more rolls similar to those from the "bad" batch with the comment that these were the best rolls they had ever seen. I checked the rolls set aside; they were brittle and of low strength as anticipated. It thus seemed that there was a large difference in gel characteristics between a roll immediately subjected to mechanical motion while the cross-linking was going on, and a roll which had been immobile. This led me to set up a laboratory replica of the test, and together with my assistant, Mr. W. J. Champion, who, by the way, is now president of Riverdale Chemical Company, I published a note about it in the *Journal of the American Chemical Society*<sup>5</sup>. The following Table shows the gist of this paper.

#### TENSILE STRENGTH IN GRAMS PER SQ. MM.

		<i>In Direction of Stretch</i>	<i>Across Direction of Stretch</i>
Stretched tanned sheet	End	171	144
	Center	192	146
Stretched tanned sheet	End	153	148
	Center	150	152
Tanned non-stretched sheet		60	
Non-tanned non-stretched sheet		155	

"Stretched" sheets were mechanically stretched and relaxed continually

without permanent deformation. It is seen that this pulsating movement caused the gels to retain their tensile strength, while the tanned (cross-linked) sheet at rest lost 61% of its tensile strength. It is apparent that a profound difference exists between the aging of a gel being cross-linked while pulsating and the aging of such a gel at rest.

This observation drew attention to the striking analogy between a protein gel, being cross-linked, and living tissue in the process of aging.<sup>6,7</sup> In both cases the end symptoms of the aging process are the same: brittleness, loss of elasticity, inability to retain bound water, increase in shrinkage temperature, or in the slope of the viscosity-temperature curve.

Now then, are there cross-linking agents present in the human body? The following table shows data from the literature reporting the normal presence in the blood stream of known cross-linking agents.<sup>8</sup>

#### POTENTIAL CROSS-LINKING AGENTS IN BLOOD

Agent	Concentration
Acetaldehyde	< 0.1 mg./100 cc.
Methyl guanidine	0.2-0.3 mg./100 cc.
Alpha ketoglutaric acid	0.2-0.9 mg./100 cc.
Pyruvic acid	0.4-2.04 mg./100 cc.
Alpha keto acids, only generically identified	0-3.1 mg./100 cc.
Citric acid	1.3-6.0 mg./100 cc.
Malic acid	0.1-0.9 mg./100 cc.
Fumaric acid, in rat	< 0.3 mg./100 cc.
Succinic acid	0.5 mg./100 cc.
Silicon	33-63 $\mu$ g./100 cc.
Lead	18-49 $\mu$ g./100 cc.
Aluminum	15-40 $\mu$ g./100 cc.
Copper	73-115 $\mu$ g./100 cc.
Iron	43-52 $\mu$ g./100 cc.
Manganese	0-25 $\mu$ g./100 cc.
Zinc	488-1272 $\mu$ g./100 cc.

But with all these cross-linking agents normally present in human blood, why does not aging take place in a matter of weeks or months rather than years. Which defense mechanism causes aging to be as slow as it is? A defense mechanism has been amply demonstrated by Schonheimer, Bald-

win, and others<sup>9, 10</sup> who have shown by isotope techniques that protein molecules in the body are continually broken down and rebuilt from the fragments. Any cross-linkage formed can be eliminated as a fragment when the protein molecule of which it has become a part is broken down.

However, there is a fatal flaw in this defense mechanism, and this flaw may be the explanation to biological aging, and should be the target for research on antigerics.<sup>11</sup>

Protein-splitting enzymes are highly specific. To break a protein chain they require certain structural characteristics. If the cross-linkage formed accidentally happens to be in a position where it so changes the structure that the proteases cannot act, then the protein molecule in question is irrevocably immobilized. It is withdrawn from normal metabolism, it cannot be excreted, mended or replaced. As more and more protein molecules become so immobilized by the random action of cross-linkers present in the blood stream, the organism loses its resilience and resistance; it ages and dies.

Let us now shift the focus to the beautiful work done by Dr. M. Rudzinska<sup>12</sup> at the Rockefeller Institute for Medical Research. The unicellular organism, *Tokophrya Infusum*, has a life span of only about 12 days. As it ages, its cell nucleus is enlarged, and under the electron microscope we can see the precipitation of a protein type material which progresses as the organism ages. As in humans, the life span of *Tokophrya* can be shortened by overfeeding. When this is done, the protein precipitation occurs at a proportionately accelerated pace.<sup>13, 14</sup>

In the history of biological sciences, major progress has often been made because of the existence of some species in which an otherwise obscure process could be easily followed. Science owes much to the lucid genetic characteristics of the banana fly, *Drosophila*, and to the nematode worm, *Ascaris*, with its large and easily observed chromosomes. Perhaps one day *Tokophrya* will be included in this list.

The progress of aging studies has suffered from the fact that it has been viewed in an infinite number of fragmentary situations, rather than as a whole. Yet it is difficult to discuss aging without some mention of the arterial system. Therefore, let us next mention the work of H. H. Zinsser, E. M. Butt, and J. Leonard,<sup>15</sup> who three years ago showed a very significant buildup of potentially cross-linking metal ions in aging aorta and presented X-ray evidence of actual cross-linkage.

One of the most characteristic indications of cross-linkage in polymers is that the cross-linked polymers no longer swell in solvents or plasticizers which exert strong swelling action on the uncross-linked polymers. From this

standpoint, we feel it is highly significant that R. R. Kohn<sup>16</sup> showed that connective tissue from lungs of old humans swells far less in dilute acid than such tissue from young individuals.

Similar differences in swelling have been observed in human diaphragm tendon by Kohn and Rollerson<sup>17</sup> and in the Achilles tendon by Banfield.<sup>18</sup> The British workers, Brown and Consden<sup>19</sup> have reported a gradual rise in the shrinkage temperature of human collagen with progressive aging, thus indicating that cross-linking occurs progressively.

H. H. Sulkin<sup>41</sup> reports an accumulation of mucoprotein in kidneys on aging which has all the earmarks of being a result of insolubilization of protein material.

Dr. N. Shock<sup>42</sup> and others, particularly Lansing<sup>44</sup>, have shown the gradual accretion of dibasic acids in aging tissues. Dr. R. Baker at the University of Southern California Electron Microscopy Laboratories has stated<sup>45</sup> that this represents accretion on the surface of elastin fibrils. It would seem likely that these dibasic acids could play an important part in insolubilizing proteins, by metal cross-linkages or otherwise.

Dr. K. H. Gustavson in Sweden, who is probably the foremost living expert on protein cross-linkages, devotes a page in his recent books to our theory on cross-linkages as related to aging, and apparently is taking this theory very seriously.<sup>20, 21</sup> Dr. Verzar in Basel<sup>22</sup>, the well-known gerontological researcher, clearly states that aging appears to be due to cross-linking of proteins.

There are three clinical corroborations of interest, which fit in beautifully with this view. It is known by every practicing physician that uncontrolled diabetes predisposes to degenerative changes in the arterial system. Diabetics have a ketogenic metabolism, most likely to give rise to cross-linking intermediates.

The inverse relationship between overweight and longevity is firmly established. The effect is far in excess of what could be explained merely by the increased load factor. It is evident that when food supply is scant, combustion tends to go cleanly to the end products, carbon dioxide and water, while when an oversupply of the starting material is present, there is a likelihood of formation of intermediate products. These intermediate products include potential cross-linkers.

Thirdly, it is fully established that ionizing radiation even in amounts insufficient to affect the blood picture, will shorten life very measurably.<sup>23, 24, 25</sup> Ionizing radiation gives rise to free radicals which are potent cross-linking agents; indeed, they are used as such in polymer technology to in-



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crease the melting point and shrinkage temperature of polymers. Harman<sup>26, 27</sup> points to free radicals as causes of aging and Henshaw<sup>40</sup> points to potential effect on aging of cross-linkages thus caused by radiation.

In addition, Medvedeva<sup>28</sup> has reported insoluble protein accumulation with aging in heart, kidney, muscle, intestine and lung. Bernstein<sup>29</sup> and Dische<sup>30, 31</sup> have reported insolubilization of lens protein with aging, and Sinex has raised the question whether acetaldehyde from tobacco smoke exerts a cross-linking in body proteins<sup>38</sup>.

To add our contribution to this mass of mounting evidence, we felt that one of the things that needed doing and that could be done with relatively modest means was to expose protein material *in vitro* to cross-linking agents, and see if these would actually impede and alter enzyme action on the proteins. We did so, and found this to be the case, as exemplified by the following table which is representative of a good many tests.

## FREE AMINO ACIDS FROM P-BENZOQUINONE TREATED GELATIN AFTER 50 HOURS OF PEPSIN CATALYZED HYDROLYSIS

Quinone Gelatin	0	15	25	40	75	150	600
Amino Acid	Ninhydrin Color Comparison						
	%	%	%	%	%	%	%
Glycine	100	77	70	70	53	53	43
Arginine	100	80	80	50	40	30	25
Alanine	100	87	80	60	43	20	20
Glutamic Acid	100	92	84	84	84	64	40
Glutamine	100	92	74	57	57	46	46
Lysine	100	92	84	84	72	64	20

This work was partly supported by a grant from the Office of Scientific Research of the Air Force.<sup>32</sup> As you see, the presence of strong cross-linking will block or impede enzyme action on the protein.

In order to check whether insolubilization of proteins occurs in irradiation as well as in aging, we ran comparative tests in which we determined the protein fraction which remained insoluble after digestion with trypsin. In rat livers, our Mr. Fred Andrews, Mrs. J. Bailey, Mr. Bruce Trenk found values which indicate protein immobilization with a statistical probability of 99% of being significant.<sup>33</sup> This work which was in part supported by a grant from AEC should be repeated with larger numbers of animals to clinch it and to cover additional organs.

A further interesting departure was made in studying the shrinkage temperature of the tail tendon of rats, which had been given beta aminopropionitrile, a chemical which Lalich and Strong had reported causes certain changes which in many ways resemble some of those occurring in aging.<sup>34, 35, 36</sup> We received some tail tendons of these animals by the courtesy of Dr. Strong and Dr. Lalich, and ascertained that the shrinkage temperature of animals having received a higher level of dosage of this chemical had increased very drastically, in a way which we could only interpret as evidence of cross-linkage of the proteins.

A most noteworthy contribution to the theory of aging was made recently by Dr. Szilard<sup>37</sup> of the University of Chicago. By calculation, Dr. Szilard has shown that the increase of mortality due to aging obeys laws of probability in a manner characteristic of random reactions. In other words, aging is due to a random phenomenon. Dr. Szilard mentions the possibility of cosmic radiation effects, but these could not account for the changes on aging, because organisms will suffer only a modest reduction in life expectancy from quantities of ionizing radiation which are ten times the total received as cosmic radiation during a life time. However, cross-linking due to contact with cross-linking agents, is very definitely a random occurrence, and so the evidence added by Dr. Szilard dovetails perfectly with this theory.

This may have seemed a long digression from the central theme of my talk, but to solve a problem, we have to know its cause. To solve a problem created by loss or decrease of certain abilities with aging, we must know the nature of aging itself. Assuming now that the mounting evidence in favor of immobilization of protein theory of aging is indeed true to facts, where can it lead us? How can we use this knowledge to plan a decisive attack on aging? What results can we reasonably hope for?

The answer seems obvious. If proteins are made immobile to any enzymes available to human organisms, then we should seek other enzymes or agents that can re-mobilize them. Soil bacteria must have such enzymes, for otherwise the earth would be covered with deposits of cross-linked protein. R. Dubos of the Rockefeller Institute has provided a technique, which should be adequate for finding such enzymes: Cross-link protein material, hydrolyze off all we can with known enzymes, then take the remaining hard core of enzymatically non-hydrolyzable protein and use it as the only nitrogen source in a mixed culture of microorganisms. Any organism which can grow in such a medium must of necessity have an enzyme which can re-mobilize the cross-linked proteins. From there on we are on familiar ground. The antibiotics industry has already worked out the techniques for

growing organisms in quantity and isolating active material.

The evidence already at hand seems most persuasive that a frozen metabolic pool of immobilized protein is increasing with age, and is indeed responsible for physiological aging.

After a few hundred or a few thousand trials, we should find an agent which will re-mobilize the aged protein and which also will be non-toxic and capable of reaching the sites of immobilization.\*

When we have this, what can we expect? At best, regression of those aging changes which have not already led to secondary irreversible damage of a different nature. At best, maintenance of the resistance to damage at the level of the 15-20 year old organism. Dr. H. Simms<sup>39</sup> of Columbia University has pointed out that this could mean an expectable average longevity of 800 years, and most of this added life would be in the physiological state of youth or of creative middle age.

We know well that the full benefit of any scientific gain does not come overnight. But even if we realize 5-10% of the potential just stated, the gain will be much worth while, and will far exceed in general public benefit any gain in sight for other medical programs, barring none!

Looking at this from the standpoint of those concerned with the betterment of the employment or earning potentials of the older members of our profession, it would seem that the time has come when we should abandon the present defeatist attitude of accepting the consequences of aging as something unavoidable, that we merely have to deal with as best we can. The time is near for positive action, for applying to the problems of aging the same concerted drive that has conquered infant mortality, bacterial disease, and that is looking with confidence on the problems of space, which certainly must include life extension adequate to cope with galactic time and distances.

The problem is clear. It can be solved. Will we solve it, or shall we again let others take the lead? The answer is now in the hands of the National Institutes of Health and the Space Agencies who alone can muster the means equal to the magnitude of this task.

\*Mandl and Cohen have just reported isolation of a bacterial elastase, which may represent a forward step in this direction.<sup>42</sup>

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## Johan Bjorksten — Unusual Person

**Dr. Bernard S. Friedman, F.A.I.C.**

*Research Associate, Sinclair Research Labs., Inc., Harvey, Illinois*

(Presented when Dr. Bjorksten received the Honor Scroll of the Chicago AIC Chapter, Oct. 1, 1959, Chicago, Ill.)

**J**OHAN BJORKSTEN started his unusual life with an unusual choice of ancestors. He was born in Finland, which is somewhat a melting pot for nationalities. His father was Judge Walter Bjorksten, whose family came from Germany in the distant past. At the time of the 30 Year War, early 1600, the Swedes

held a considerable part of Northern Germany and at that time his father's family moved within the Swedish orbit. But by the time of Charles XII, they were already settled in Finland. Johan's mother descends from the Ramsay family which traces its history back to the late 1500's when Ramsay left his Scottish home

to serve in the military forces of the King of Sweden. The military campaign being successful, Ramsay was rewarded with a grant of land in Finland.

With all that Viking blood, and some Scottish, too, it is not surprising that Johan would be in love with the sea. He acquired his first sailboat when he was 12 years old. He and his father sailed it home from the distant city where it was purchased. Johan often went off for long sailing trips on the Gulf of Finland and among the islands of the Finnish Archipelago. He still takes much pleasure in sailing, in Florida and other coastal waters, and on Lake Mendota in Madison, where he owns a sailboat.

Johan entered the University of Helsingfors at 16, and after obtaining the master's degree there, went to the University of Stockholm as guest research worker under the famous Dr. H. von Euler. Following the completion of the work for the Ph.D., he accepted an international fellowship from the Rockefeller Foundation to do post-doctorate study on protein chemistry at the University of Minnesota under the late Prof. R. A. Gortner. He then entered the business and industrial world to establish his career.

In one respect Johan is not unusual. He has a family. But then his children are unusual—they are not only unusually handsome but unusu-

ally well-traveled. His daughter, Sybil Joan, is a senior at the University of Wisconsin. She is now studying at the University of Grenoble, France. An experienced traveller, she has seen most of the United States and most of Europe where she has spent her summer holidays for several years.

His son, Oliver, has spent summer holidays in Switzerland, Germany, and Spain. However, to gain experience to help him select a proper career, he has spent the last two summer vacations working in industry. He is now a student at George School in Pennsylvania.

In 1939, Dr. Bjorksten's parents emigrated from Finland to the United States. Judge Bjorksten had had a long and active career in Finland, and his years of retirement were spent in Philadelphia and in Madison, near his son. Mrs. Walter Bjorksten still lives in Madison.

In still another respect Johan is unusual; he is interested in an unusually large variety of scientific and technical fields. The societies to which he belongs indicate this breadth of interest: Association of Consulting Chemists & Chemical Engineers (Director); Chicago Technical Societies Council (Director); AAAS (Fellow); American Chemical Society; American Association of Cereal Chemists; American Association of Cosmetic Chemists; American Association of Textile Chemists & Col-



## JOHAN BJORKSTEN . . .

orists; American Geological Society; American Society for Metals; ASTM; Chemical Arts Forum; Franklin Institute; National Farm Chemurgic Council; Chemical Society of Finland; Society of Plastics Industry; N. Y. Academy of Science; Societas pro Fauna et Flora Fennica; TAPPI; The Chemists' Club; Chemists' Club of Chicago; Madison Technical; Madison Rotary; Gamma Alpha, Sigma Xi and Alpha Chi Sigma of which he is an honorary member.

He has long been a loyal and devoted member of the AIC. We of the Chicago Chapter are especially mindful of his dynamic leadership as chairman of the Chapter, and we are grateful for his conscientious and forthright representation of the Chicago Chapter in the National AIC Council.

Dr. Bjorksten does not believe in wasting time. In his article on this subject, published in *Chemical & Engineering News*, 21, 1324 (1943), he said:

"Time is the most precious fluid in existence, because it can be neither produced nor stored. We have an allotted span of time to accomplish our life's work; any loss from it is irreplaceable . . . However, time and motion study is more than a mere aid to increased accomplishment and earnings—it is a philosophy and a state of mind. It stands on the fact that every motion or emotion which does not give a counter-value in pleasure, or in accomplishment, is time irretrievably lost. Pioneers in this study have

written that time is money, but that is only a part of the truth, for time is more than money. Time is a part of your life span, which, once wasted, cannot be brought back at any price."

Johan practices what he preaches.

He is an early riser and often has business breakfast appointments. His associates say that he has never been known to be late for an appointment.

He is a young man in a hurry. Anyone who has walked with him knows how difficult it is to keep up with his pace. An associate has developed the habit of walking just a step or two behind him; his theory is that Dr. Bjorksten subconsciously has the compulsion to set the pace and thus walk just a bit faster than his companion!

Time is never wasted because of the inconvenience of working quarters when Dr. Bjorksten travels. His standard equipment includes a portable typewriter and a dictating machine. Although he travels extensively, his office staff sometimes is scarcely aware of his absence, and the routine is not interrupted, for he keeps in touch by telephone and dictation.

Dr. Bjorksten has an unusually extensive vocabulary. He not only knows his native tongues of Swedish and Finnish, but he has an excellent command of English, and speaks, reads, writes, or understands, nearly all the languages of Europe.

Do not get the idea that he is a "gabby" person, certainly not when

he sends telegrams. Last year when Dr. Bjorksten was in Europe, he was sent an air mail letter asking if he would speak at the 1958 Honor Scroll dinner. It took some time for our letter to catch up with the Flying Finn, but he wasted no time replying. We received a cablegram reading: "Yes," signed "Bjorksten." Johan is also a registered patent agent, where his talent for logical thought and conciseness is valuable.

He is quick to conceive, and there are times when one feels he knows what you are about to say even before you speak the words. He prefers to work and live with associates who think and act quickly. Procrastination has no place in his life.

We honor a gifted and unusual person, a creative scientist, and an effective advocate of the professional chemist.

## Johan Bjorksten — Pathfinder

**Durward O. Guth**

*Guth Products Co., 850 West Weed, Chicago, Ill.*

(Excerpts from talk given when Dr. Bjorksten received the Honor Scroll of the Chicago AIC Chapter, Oct. 1, 1959, in Chicago, Ill.)

**T**HE ship of Dr. Johan Bjorksten's life had already been firmly set upon its Pathfinder course by the time he was six. At that time his uncle asked him if he knew what he wanted to be when he grew up. Johan stated unhesitatingly and unequivocally, "I am going to be an inventor." Surely the proverb, "As the twig is bent so grows the tree," was never more true than with Dr. Bjorksten.

As the twig was bent in his youth, his pathfinder destiny found simple expression by the term "inventor." With maturity, and an ever broadening horizon, he has exercised his pathfinding talents on an ever broader scope. His original thinking in the fields of philosophy, human relations, time and motion study, and business management, have made him a pathfinder in these fields too. His articles

are always pithy and thought provoking. He has done much toward the betterment of the chemical profession and the lot of the chemist as an individual. He has taken time to do all these things, in addition to being a chemist. . . .

Dr. Bjorksten is president of the Bjorksten Research Laboratories which he founded in 1944 for sponsored industrial research. By 1947, in an article in *Chemical & Engineering News*, he was included among the ten outstanding consulting chemists.

Today, Bjorksten Research Laboratories at its headquarters at Madison, Wis. has a large three-story fireproof main laboratory building and a number of conveniently located smaller quarters used for specialized research projects and for classified

Government research. From the modest beginning in 1944 with a half dozen on the staff, it now has more than 100.

In 1953, Dr. Bjorksten founded the Bjorksten Research Foundation, a non-profit corporation engaged in research looking toward increasing the span of mankind's productive years. Dr. Bjorksten, and the Bjorksten Research Laboratories, have contributed many thousands of dollars to the important work of this Foundation.

In 1940, he was co-founder of the ABC Packaging Machine Corporation, and he has been vice-president of that corporation from 1943 to the present. He was co-founder and president of Bee Chemical Co. from 1944 to 1946.

Dr. Bjorksten holds around 50 patents in the fields of organic chemical synthesis, graphic arts, high polymers, and petroleum products, though these by no means measure his inventive accomplishments since much of his work in Government sponsored research is "classified." Much of the work in industrial sponsored research also is unpublished as many companies prefer to retain this information as "trade secrets," rather than to make it public under the doubtful protection that they consider the Patent Office, as it now operates, grants to chemical inventions. Dr. Bjorksten has written a cogent article on this

subject in the April 26, 1948, issue of *C & EN*.

One of the more recent developments of his laboratories, of which the public is aware, is "Foamed Metals." By foaming metal a structure is obtained similar to rubber sponge. It is at the same time very strong, very light, and a poor conductor of heat. Many have seen the demonstration of blocks of Foamed Aluminum and of balsa wood floating on water. The Foamed Aluminum is lighter than the extremely light balsa wood, yet it is strong. It has already demonstrated its value for structural parts in architecture and aviation. A large new plant is being built in Texas for the production of Foamed Aluminum. Foamed Metals is an example of Dr. Bjorksten's talents as a pathfinder. Many said it could not be done, yet he charted the route to do this very thing by exploring untraversed regions of metallurgy.

These things are the serious Dr. Bjorksten, but he is not all serious scientist. Few are aware that he is an accomplished linguist and that, as a hobby, he translates Scandinavian poetry into English. He has quite a collection of unpublished works. He enjoys nothing better than to sail his own boat on Lake Mendota at Madison. What is more, it is a laminated fibreglass boat—laminated fibreglass being one of his many fields of activity. He has a humorous side too, with his own subtle and Scandinavian

variety of humor. One has only to read his learned (?) dissertation on "Plastical Archeology" in the Feb. 1952 issue of *S.P.E. Journal* to enjoy this humor.

Dr. Bjorksten received the M.S. degree in organic chemistry (1927) and the Ph.D. degree in biochemistry (1931) from the University of Helsingfors, Finland. During this period he was honored to be a guest research worker at the University of Stockholm, Sweden, where he became vitally interested in protein chemistry. Some of his early papers were published in *Biochemische Zeitschrift* and received worldwide circulation. Under the auspices of the International Education Board of the Rockefeller Foundation, he did post-doctorate research on proteins (1931-32) under Dr. R. A. Gortner at the University of Minnesota.

The next ten years were spent in industry as research chemist, chief chemist, and chemical director, where he continued to do much original

work on proteins, as shown by articles in technical journals and by patents. A world tour to study conditions, particularly in Asia, Africa, and South America, gave him a broader viewpoint.

During this period he made important discoveries in the protein field that were to provide his fertile mind with a new concept of the aging process. As early as June 1941 in *Chemical Industries* and 1942 in the *Journal of the American Chemical Society*, he set forth his findings and called attention to its implications regarding human aging. Since then one scientific worker after another reports findings that lend support to his original concept. Now again, Dr. Bjorksten's talent as a pathfinder is leading him down the route through unexplored territory in the field of the living body and the great benefits that may be obtained by increasing the span of mankind's productive years.

## Presentation of the Honor Scroll

THE Honor Scroll of the Chicago AIC Chapter was presented to Dr. Johan A. Bjorksten, F.A.I.C. of Bjorksten Research Laboratories, Inc., Madison, Wis., at a dinner preceded by a reception, held at the Furniture Club of America, Chicago, Ill., on October 1st.

Dr. Walter S. Guthmann, F.A.I.C., of Morton Chemical Co., Chi-

cago, chairman of the Chapter, presided. Dr. Bernard S. Friedman, F.A.I.C., research associate, Sinclair Research Laboratories, Inc., Harvey, Ill., spoke on "Johan A. Bjorksten—Unusual Person." Durward O. Guth of Guth Products Co., Chicago, spoke on "Johan A. Bjorksten—Pathfinder." (See preceding pages.)

Dr. Wayne E. Kuhn, AIC presi-



*Dr. Kuhn, Dr. Guthmann, Dr. Bjorksten*

— C & EN

dent, presented the Honor Scroll to Dr. Bjorksten, who responded with an address entitled, "Extending the Productive Part of the Scientist's Life—A Positive Approach to Employment After 50." (This paper, retitled, "Aging — A Positive Approach," appears on preceding pages.)

The citation on the Honor Scroll reads:

To

**Dr. Johan A. Bjorksten**

*in grateful recognition for his stalwart service to chemists and their profession; for his zeal and enthusiasm for research, and for his enterprising spirit and achievement in the field of science and technology.*

Hooker Chemical Corporation, Niagara Falls, N. Y., will establish corporate headquarters at 666 Fifth Ave., New York, N. Y., in March.

The Louis Allis Company, Milwaukee, Wis., announces the construction of a new research and development center in Greendale, Wis. The building will be staffed by 100 engineers and technicians.

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## Student Medalists of 1959

STUDENT MEDALIST	COLLEGE	AIC CHAPTER WHICH MADE THE AWARD
Albert, Jerry D.	Occidental College	Western
Alberts, Gene S.	State College of Washington	Western
Armstrong, Roger W.	Tufts University	New England
Bailey, Donald S.	Ottawa University	Midwest
Barker, Walter M.	Purdue University	Chicago
Bateman, Thomas L.	University of Pennsylvania	Pennsylvania
Bath, Thomas D.	University of Kansas	Midwest
Beck, Thomas A.	Xavier University	Ohio
Bennett, Thomas P.	Florida State University	Louisiana
Bergonzoni, Aldo	New York University	New York
Berland, Peter	Adelphi College	New York
Bibler, Ned	Denison University	Ohio
Bieron, Joseph	Canisius College	Niagara
Birkmeyer, William	University of Dayton	Ohio
Bordenca, Ann	Howard College	Alabama
Brand, Myrna	University of Illinois	Chicago
Brenner, Stephen A.	Boston University	New England
Brokars, Carol	Chestnut Hill College	Pennsylvania
Brown, Melancthon S.	Stanford University	Western
Buchler, Charles A.	College of St. Thomas	Chicago
Buhsmer, Charles P. Jr.	King's College	Pennsylvania
Burnett, Donald S.	University of Chicago	Chicago
Casnoch, Joseph A.	New York University	New York
Chappell, Golford A.	University of Wichita	Midwest
Chauviere, Eugene C. Jr.	Tulane University	Louisiana
Chortyk, Orestes T.	Drexel Institute of Technology	Pennsylvania
Christoffersen, Ralph E.	Cornell College	Midwest
Church, John A.	University of Virginia	Washington, D. C.
Clark, James R.	Villanova University	Pennsylvania
Clemons, Thurman	Tuskegee Institute	Alabama
Coffey, John W.	Rockhurst College	Midwest
Colburn, Richard P.	Loyola University	Western
Conrad, Joseph	University of Missouri	Midwest
Cordes, Shirley A.	Radcliffe College	New England
Coston, Charles J.	University of Oregon	Western
Culp, Juanita L.	George Pepperdine College	Western
Davidson, Harold W.	Sterling College	Midwest
Davis, Paul R.	Mount Union College	Ohio
Dear, John M.	Seton Hall University	New Jersey
Donovan, Thomas A.	Knox College	Chicago
Dudley, Daniel	Drake University	Midwest
Elliott, Carolyn M.	Wellesley College	New England
Evans, Fennell	Pomona College	Western
Farnsworth, Frank W.	Worcester Polytechnic Institute	New England
Fitzgerald, Jerry M.	University of Colorado	Midwest
Flowers, Berneice	Peabody College	Alabama
Fordham, Joseph R.	College of the Holy Cross	New England
Fratantoni, Joseph C.	Fordham University	New York
Fratalli, Victor	University of Scranton	Pennsylvania
Friedman, H. George, Jr.	Loyola University	Louisiana
Garner, Vivian B.	Howard University	Washington, D. C.
Goodisman, Jerry	Columbia University	New York



STUDENT MEDALIST	COLLEGE	AIC CHAPTER WHICH MADE THE AWARD
Gould, Robert O.	Williams College	New England
Graham, Edward W.	Louisiana State University	Louisiana
Grossman, Charles J.	Newark College of Engineering	New Jersey
Guennette, Sandra	Lake Erie College	Ohio
Harriman, John E.	University of Wisconsin	Chicago
Harvey, Richard A.	University of Utah	Western
Heins, Conrad	Drew University	New Jersey
Heller, Barbara J.	College of Mt. Joseph on the Ohio	Ohio
Henderson, Mary E.	Simmons College	New England
Herzog, Stanley	City College	New York
Hobrock, Brice G.	Kansas State Teachers College	Midwest
Hoffecker, Robert B.	Drexel Institute of Technology	Pennsylvania
Homann, H. Robert	Beloit College	Chicago
Howard, Marshall A.	William Jewell College	Midwest
Huffman, Robert W.	Ohio University	Ohio
Huhak, James	Hiram College	Ohio
Ide, Roger H.	Wabash College	Chicago
Jacobson, Arthur I.	Roosevelt University	Chicago
Jennings, Margaret S.	Immaculate Heart College	Western
Keyser, Leon F.	University of Notre Dame	Chicago
Kief, Mabel M.	Oregon State College	Western
Kiefer, Richard	Drew University	New Jersey
Kieffer, Brother		
Ambrose L., F.S.C.	De LaSalle College	Washington, D. C.
Kochler, Karin U.	George Washington University	Washington, D. C.
Kosier, John W.	Niagara University	Niagara
Kremer, Ross	Pennsylvania State University	Pennsylvania
Kunze, Robert W.	Rutgers University	New Jersey
Lagace, Arthur P.	Tufts University	New England
Lampi, Jeanne P.	University of Massachusetts	New England
Lanier, Randolph D.	Vanderbilt University	Alabama
Lanier, Warren	University of Georgia	Louisiana
LaPara, Nicholas A.	Lehigh University	Pennsylvania
Lechner, David M.	St. Bonaventure University	Niagara
Lester, Sara P.	Texas Woman's University	Alabama
Levine, Stephen	Brandeis University	New England
Levy, Jerome F.	University of Michigan	Chicago
Liebling, Gerald	Polytechnic Institute of Brooklyn	New York
Liu, Shirley	Smith College	New England
Loney, Laura L.	Ursinus College	Pennsylvania
Lukinac, Eugene	University of Akron	Ohio
Lundstrom, Robert E.	Clark University	New England
Mattingly, Thomas W., Jr.	Georgetown University	Washington, D. C.
Matwiyoff, Nicholas A.	Michigan College of Mining & Technology	Chicago
McCormack, John J.	Boston College	New England
McKinley, Marvin D.	University of Florida	Louisiana
Meyer, Edwin F.	DePaul University	Chicago
Meyer, Paul D.	Illinois Institute of Technology	Chicago
Miller, Robert H. Jr.	Alabama A. & M. College	Alabama
Mixon, William B. Jr.	University of Mississippi	Louisiana
Mopsik, Frederick I.	Queens College	New York
Moradiellas, Darwin P.	University of Florida	Alabama
Morris, Cletus E.	Alabama Polytechnic Institute	Alabama

## STUDENT MEDALIST

## COLLEGE

AIC CHAPTER  
WHICH MADE  
THE AWARD

Morton, Katherine	Alabama College	Alabama
Moyer, Charles E., Jr.	Amherst College	New England
Myers, Gardiner H.	Princeton University	New Jersey
Newman, Norman	Brooklyn College	New York
Nisbet, Alex R.	University of Texas	Louisiana
Norton, Peggine Ann	Florence State College	Alabama
Oldham, Robert D.	Bradley University	Chicago
Olson, John R.	Monmouth College	Chicago
Orloski, Raymond F.	Loyola University	Chicago
Oswald, Kenneth	Christian Brothers College	Alabama
Ott, Vega Jean	University of Alabama	Alabama
Ouellette, Robert J.	University of Vermont	New England
Parker, Lewis A.	Middlebury College	New England
Pawlak, Joseph A.	University of Buffalo	Niagara
Pitzer, Russell M.	California Institute of Technology	Western
Rauch, Francis C.	Saint Joseph's College	Pennsylvania
Reber, Howard	Temple University	Pennsylvania
Roberts, Jean	University of Maryland	Washington, D. C.
Robinson, Robert L.	Oklahoma State University	Louisiana
Rosen, Allan J.	Harvard University	New England
Rosenberg, Harvey S.	The Cooper Union	New York
Ross, Thomas H.	University of Arkansas	Louisiana
Rownd, Robert H.	St. Louis University	Midwest
Rubenstein, Lester A.	City College	New York
Schuster, Ingeborg M.	University of Pennsylvania	Pennsylvania
Schwab, Peter A.	Regis College	Midwest
Shrier, Adam	Columbia University	New York
Simpson, Paul G.	University of Southern California	Western
Skopp, Alvin	Polytechnic Institute of Brooklyn	New York
Smola, Frank M.	University of Massachusetts	New England
Smith, Paul V.	The Creighton University	Midwest
Snodgrass, James M.	Massachusetts Institute of Technology	New England
Spanier, Edward J.	LaSalle College	Pennsylvania
Steele, William LeRoy	Kent State University	Ohio
Stelman, David	Pennsylvania State University	Pennsylvania
Suffern, Eleanor M.	Philadelphia College of Pharmacy & Science	Pennsylvania
Swann, Nancy G.	Mississippi State University	Louisiana
Taylor, Hugh A.	New York University	New York
Teffteller, Joseph W.	A. & M. College of Texas	Louisiana
Thanassi, John W.	Lafayette College	Pennsylvania
Thornton, Fred H.	Central College	Midwest
Todd, Aaron W.	Georgia Institute of Technology	Louisiana
Ulery, Harris E.	Grinnell College	Midwest
Waltz, Edwin S.	Pennsylvania Military College	Pennsylvania
Wangler, John C., Jr.	American University	Washington, D. C.
Wickham, Hollis	University of Omaha	Midwest
Willey, Frederick G.	Massachusetts Institute of Technology	New England
Willoughby, Grace E.	Douglass College	New Jersey
Winsky, Arlen	Bethel College	Midwest
Woodruff, Carol	University of Cincinnati	Ohio
Wunderlich, Frank J.	Villanova University	Pennsylvania
Wyatt, Carole S.	Indiana University	Chicago
Yang, Dominic	St. Benedict's College	Midwest
Young, David P.	Parke College	Midwest

## A Message to Student Medal Recipients

Dr. R. P. Allard, F.A.I.C.

*Chairman, Department of Chemistry, Loyola University, Los Angeles 45, Cal.*

THE attainment of the college degree and this student medal stamps you as worthy candidates for higher learning, and to those of you who contemplate such careers I direct this message, taken from the writings of C. A. Kettering:

"I can take a group of young people and teach them to be inventors, if I can get them to throw off the hazard of being afraid to fail—the more education a man has the less likely he is to be an inventor. This is because, throughout his life he has been

taught the danger of failure. From the time he enters first grade until he graduates from the university he is examined three or four times each year and if he fails he is out and in many cases disgraced.

"In research and invention work you fail hundreds and even thousands of times, but if you succeed once you are in. The educated person must be taught that it is not a disgrace to fail and that he must analyze every failure to find its cause. He must learn to fail intelligently—for failing is one of the greatest arts of the world."

## How Student Medal Awards Are Made

### Origin

The idea of student medals for outstanding chemistry and chemical engineering graduates originated in 1934, when the Washington AIC Chapter proposed such an award as a local Chapter activity. The National AIC Council decided that Student Medals to outstanding college seniors should be made an activity for all Chapters, if they desired, and not be limited to one Chapter.

Consequently a Committee was appointed, with Florence E. Wall, F.A.I.C., as chairman, to decide upon the form of the medals. The committee selected a golden bronze medal, to bear on its face the words, "Award of The American Institute of Chemists, Inc., for scholastic achievement," and to carry, on the reverse side, the name of the medalist, the college, and the date of presentation.

The conditions governing the award were decided by the Committee on Education, which had as its chairman, in 1934, the late Prof. Walter T. Taggart, F.A.I.C., of the University of Pennsylvania.

The first student medals were awarded in 1935 by the New York Chapter, the Washington Chapter, and the Niagara Chapter. Three of these student medalists are presently members of the AIC: John

Boustead, Louis Robert Heiss, and Francis Patrick McGrath.

Until 1956, Associate AIC membership for one year was given to the award recipients. In that year the Council appointed a Committee, under the chairmanship of John Kotrady, to review student medal procedures. As a result, it was decided that Associate membership would not be conferred with the medal, but that a subscription to *THE CHEMIST* for one year would be given. In addition, an annual Essay Contest was established, in which current medalists could participate. The paper judged to be the best, each year, on the subject of "Chemistry (or Chemical Engineering) as a Profession," would receive a prize of \$100.00, and all who entered the contest would receive an additional year of *THE CHEMIST*.

### Source of Information

Information covering Student Medals will be found in the AIC By-laws, Article XIV. (See *THE CHEMIST*, April 1958). In brief, the awards are made by the national AIC, upon recommendation of the Chapters. Each award shall be to a senior who is majoring in chemistry or chemical engineering at an educational institution acceptable to the Council. The

recipient of the award in each educational institution shall be recommended by the chemistry or chemical engineering faculty to the Chapter. The basis of selection shall combine leadership ability, character, and high scholastic standing. The presentation of the medals shall be made by the Chapters.

### Chapter Procedure

Each Chapter that desires to make Student Medal Awards should appoint a Student Medal Committee to contact the heads of the chemistry or chemical engineering departments of the local educational institutions, to obtain the names of outstanding seniors (only one from each department). These names, the names of the educational institutions, and the dates of presentation for each, should be sent to the national AIC Secretary, at least 30 days before the presentation date.

The AIC Secretary will have the medals engraved and sent to the Student Medal Committee (or designated person) as soon as possible. Accompanying each medal will be a letter with information about the Essay Contest. The Chapters may present these medals at the graduating exercises of the classes, at Honors Day Convocations, or at meetings of the Chapters. (Also see, "Chapter Operations—a Manual for Officers & Councilors," which is available, on request, to Chapter officers.)

### "The Challenge of Ignorance"

Today, world-wide advances in communication and transportation have made evident to the "have-nots" of this earth the disparity of their lot, as contrasted with that of the "haves." Probably never before in recorded history have so many peoples, in so many places, become so aware of the limitations of their social, political, and economic life and their own personal needs. Is it not possible that many of these needs, while social in nature, may depend

upon the physical sciences for their solution? . . .

It is a matter of immediate concern that we take a long, broad look at our whole world. It is imperative that we learn from qualified experts the needs of other industries, of other sciences, and indeed, of other peoples of this earth . . . Needs represent not only danger and hardship, they also represent the hope and the opportunity for a better world. This is the challenge of our ignorance.

—Harry B. McClure, Hon. AIC

(From address accepting the Chemical Industry Medal of the SCI, American Section)

### Professional Reprints Available

(Free)

"American Education Meeting the Soviet Challenge," Dr. William E. Stevenson; "The Chemist and National Defense," Maj. Gen. Marshall Stubbs; "The Chemist and the World Economy," Dr. R. H. Rowntree. Reprinted from THE CHEMIST (June 1959). Request from THE CHEMIST, 60 E. 42nd St., New York 17, N. Y.

"Research Business," By Dr. Roger W. Truesdail, F.A.I.C., Truesdail Labs., Inc., 4101 N. Figueroa St., Los Angeles 65, California. Reprint from *Industrial Research Magazine* (Summer 1959). Request from the author.

"Who Develops New Products?" by Dr. Wayne E. Kuhn, F.A.I.C., Texaco Inc., Box 509, Beacon, N. Y. Preprint of talk given at the 41st National Meeting of the AIChE. Request from the author.

"What Price Do We Pay for Imports?" Reprint from *The Educational Focus* (Vol. XXX, No. 1). Request from Bausch & Lomb Optical Co., Rochester 2, N. Y.

"If You are Self-employed" and "Tax Benefits for the Self-employed." Booklets. Request from Trust Officer, The Bank of New York, 48 Wall St., New York, N. Y.

## A Threat to Free Enterprise

One of the most serious threats against the independent laboratory profession today stems from the unfair competition by the non-profit tax-exempt research institutes and by some educational institutions.

Many of our readers probably are unaware that this situation exists. Recently a leader in the Merchants and Manufacturers Association when told of this condition said, "I had no idea you faced this kind of competition." A past officer of the National Association of Manufacturers was asked, "Are you opposed to the competition of non-profit retail co-operatives?" As his blood pressure rose, he emphatically answered in the affirmative—sorry, we can't print his actual words. We submit to you whether there is any fundamental difference in principle between the operation of a tax-exempt research-for-business organization and a tax-exempt retail-for-business cooperative, particularly as sources of unfair competition? Both tend to throttle our system of free enterprise and push us farther down the road toward complete socialism.

These non-profit operations were created with noble purposes, in some cases, under tax-free charters. In most instances, it was planned they would carry out basic research for the good of the public or they would develop new processes and products with such research results freely available to all. Thus, they were

granted Federal tax exemption, as well as State, County and Municipal tax exemptions in some cases.

Almost without exception, they went into the business of applied research, testing, and analysis, with little attention to their original purpose. Some of them brazenly advertise their commercial services, some even print schedules of fees, some use the facilities provided by the very tax-payers with whom they compete, some camouflage routine testing projects as "research" and all of them make industrial research results available only to their sponsor.

Who can conduct essential industrial research, testing and analysis if educational institutions and research institutes return to their traditional obligation to do academic research? The obvious answer are the company owned laboratories and the independent laboratories.

The American Council of Independent Laboratories will continue to challenge the status of any tax-favored group which poses as serving the public without providing access to findings by qualified persons, except those involving national security. There is evidence that professional groups such as the consultants and marketing research people, who face similar unfair competition, will join this fray.

—*Chemistry in Action*  
Truesdail Labs., Inc.  
Los Angeles 65, Calif.

## Opportunities

### Doris Eager, M.A.I.C. Positions Available

**Chemist (Female)** college graduate, major in chemistry, 1 to 2 years' experience in analytical chemistry, food, detergent or cosmetic field preferred. Bring resume. Personnel Office, Hearst Magazines, 309 West 56th Street, New York 19, N. Y.

**Chemist or chemical engineer** for research and development work in asphalt roofing and siding. B.S. degree with 2 to 3 years experience in asphalt field. Location N. J. Salary to \$7,000. Box 121, THE CHEMIST.

**B.S., chemistry or chemical engineering**, 4 to 5 years experience in building paper, mineral wool, glass fibers. For research and development of new products; customer contact to introduce new products; develop solutions to special problems. Some travel. Reports to Research Director. Location N. J. Salary \$10,000. Box 123, THE CHEMIST.

**Organic or physical chemist**: 2 years experience in adhesives as related to acoustical tile, wall board, cove facings. Knowledge of fillers, solvents and resins helpful. To serve as plant chemist for Adhesives Division. Work divided, 75% research and development; 25% quality control. Location Pennsylvania. Salary \$7,000-8,000. Box 125, THE CHEMIST.

**Free lance analytical chemist** wanted. Starch based powder compounds. New York City Area. ALgonquin 5-4551.

**Opportunities in research** in the fields of chemistry, mathematics, metallurgy, physics, Grades GS-5 and GS-7. Salary range \$4,490 to \$5,430. Apply to Executive Secretary, Board of U. S. Civil Service Examiners, National Bureau of Standards, Washington 25, D.C.

**Bacteriologists**, GS-5 thru GS-15, salary range \$4,040 to \$12,770. Apply to Executive Secretary, Board of U. S. Civil Service Examiners, Fort Detrick, Frederick, Md.

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tion Specialist" from Major General R. V. Lee, The Adjutant General, Dept. of the Army, Washington 25, D.C.

Some Bulletins on Civil Service openings may be examined at the office of The American Institute of Chemists, Room 829, 60 East 42nd St., New York, N. Y.

## About AIC Members

**Dr. Harold Weinberger, F.A.I.C.**, has been appointed associate professor of chemistry in the School of Engineering and Science of Fairleigh Dickinson University, Teaneck, New Jersey.

**Dr. R. L. Bateman, F.A.I.C.**, director of market development, Union Carbide Chemicals Co., New York, N. Y. will head the 1959-60 fund drive for The Chemists' Club Library, New York 17, N. Y.

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## ABOUT AIC MEMBERS

**August H. Homeyer, F.A.I.C.**, has been appointed to the Executive Committee of the Board of Directors of Mallinckrodt Chemical Works, St. Louis 7, Mo.

**Dr. Fred Von Hessert, F.A.I.C.**, president, Fairmount Chemical Co., Inc. announces the removal of the company's main offices and the shipping & receiving departments to 117 Blanchard St., Newark, N. J. Certain manufacturing facilities will remain at 600 Ferry St., Newark. The New York city sales office at 136 Liberty St., will be unaffected by the change.

**Dr. Austin W. Fisher, Jr., F.A.I.C.**, has been appointed vice president and director of research of Ludlow Papers, Inc., Needham Heights, Mass. He was formerly with Arthur D. Little, Inc.

**Dr. Francis Joseph Weiss, F.A.I.C.**, scientific consultant on food and nutrition, is now on the staff of the Science & Technology Division of the Library of Congress as foreign research analyst. He will review the world literature in certain fields of physical and biological sciences and report on significant developments.

**Dr. Herman F. Mark, F.A.I.C.**, professor, Polytechnic Institute of Brooklyn, N. Y., will receive the 1960 William H. Nichols Medal of the American Chemical Society, New York Section. Presentation will be made in March.



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**Rose Marie Brunetti, M.A.I.C.**, was married to Robert L. Carmack, Jr. on October 24. They reside at Silver Birch Resort, Walloon Hills, Michigan.

**Paul B. Slawter, Jr., M.A.I.C.**, vice president, G. M. Basford Co., 60 E. 42nd St., New York 17, N. Y., has been elected secretary of The Chemists' Club. He fills the post vacated by **Dr. Lloyd Van Doren, F.A.I.C.**, who served as secretary of the Club for 14 years, until he retired to Tempe, Arizona. Mr. Slawter is also editor of the Club house organ, *The Percolator*.

**Elbridge S. Stevens, M.A.I.C.**, is now with Nopco Chemical Co., Harrison, N. J., in the Industrial Development Laboratories.

**William L. Abramowitz, F.A.I.C.**, formerly president, Carlon Products Corp., Aurora, Ohio, now succeeds Brigham Britton as chairman of the Board. Mr. Abramowitz has also been named chief executive officer of the firm; vice chairman of the Board of Directors, and chairman of the Executive Committee.

**Carl Bussow, F.A.I.C.**, A. W. Dow, Inc., New York, N. Y., has been elected president of the Association of Consulting Chemists & Chemical Engineers, Inc., New York 17, N. Y. **Emerson Venable, F.A.I.C.**, consulting chemical engineer, Pittsburgh, Pa., has been elected secretary.

**Dr. John A. King, F.A.I.C.**, director of research of Armour & Company, Chicago 90, Ill., announces that **Dr. J. Peter Kass, F.A.I.C.**, has joined the company as director of the Central Research Laboratories, a newly created position.

**Dr. Francis J. Curtis, Hon. AIC**, retired vice president of Monsanto Chemical Company, will receive one of the two 1959 Founders Awards of The American Institute of Chemical Engineers. Presentation will be at the A.I.Ch.E. annual meeting in San Francisco, Dec. 6-9.

**Dr. Lloyd A. Hall, Hon. AIC**, attended the inauguration of Dr. Emil Mrak, food scientist, who became chancellor of the University of California, at Davis, Calif., October 23.

**Dr. Arthur C. Cope, F.A.I.C.**, Chairman ACS Board of Directors, announces that the American Chemical Society has established a new staff division in the Office of the Executive Secretary, Washington, D.C. The new unit is known as the Division of Public, Professional, and Member Relations. James H. Stack is director of the new division.

**Dr. Glenn T. Seaborg, Hon. AIC**, Nobel laureate and chancellor of the University of California, will receive the Enrico Fermi Award of the Atomic Energy Commission, for 1959, at ceremonies at Commission Headquarters, Germantown, Maryland, Dec. 2. He is cited "for discoveries of plutonium and several additional elements and for leadership in the development of nuclear chemistry and atomic energy."

**A. F. Parks, F.A.I.C.**, president of the Washington AIC Chapter, has transferred from the Bureau of Customs, to be special assistant, Office of Technical Service, U. S. Tariff Commission, 8th & E Streets, N.W., Washington 25, D.C.

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## For Your Library

### Soviet Research in Fused Salts

*Part I: Systems (Binary; Ternary; Quaternary Reciprocal); Part II Electrochemistry; aluminum and magnesium, corrosion. Theoretical; Thermodynamics; Slags and Mattes. Chemistry Collection Series. Consultant Bureau, Inc. N. Y. 1958. Part I, 146 pp. 8½" x 11". \$30.00. Part II, 268 pp. \$20.00. Complete collection \$40.00.*

These pamphlets bring the Consultant Bureau series of English translations of Soviet research material up through 1956. Articles have been selected from the publications of leading Soviet scientific societies: Atomic Energy, General Chemistry, Applied Chemistry, Academy of Sciences, Division of Chemical Science and Chemistry, and Technology Sections.

Phase diagram studies are the only ones included here. The section "Binary Systems" consists entirely of papers dealing with oxygen containing melts, while these are preceded in the "Ternary Systems" by halide melts. The "Quaternary Reciprocal Systems" have been broadly arranged in this order—halides, oxides and mixtures.

The editor, Dr. Leonard Nanis of the Columbia University School of Mines, points out that the chief point of difference between U. S. and Soviet fused salt research lies in the attention devoted to quaternary reciprocal phase diagram studies. He sees no extraordinary concentration in any particular division of this research with the possible exception of "Corrosion." References cited are mainly Russian.

—Dr. F. A. Hessel, F.A.I.C.

### The Solid State for Engineers

*By Maurice J. Sinnott. John Wiley & Sons, Inc. 1958. 522 — xii pp. \$12.50.*

Prof. Sinnott has attempted to fill the gap that separates the engineers' view of materials and their properties from the physicists' swiftly advancing field of solid state physics. Thus the book is neither a treatise on properties of materials for physicists nor a dissertation on solid state physics for engineers. Rather it explores the territory common to both where each may happily and usefully learn from the other. In so doing, the author surveys and

condenses into single chapters current knowledge and theories about each aspect of the broad basic subjects. In each he modifies and applies the resulting findings to practical problems. The applications of theory are made clearer by the inclusion of frequent illustrative problems, less in the style of a text book than of examples to clarify methods. Bibliographies appended to the chapters suggest where the reader can go for more material to amplify the condensed versions. A valuable contribution.

—D. H. Killeffer, F.A.I.C.

## Chemical Books Abroad

DR. RUDOLPH SEIDEN, F.A.I.C.

Verlag Chemie, Weinheim/Bergstr.: *Papierchromatographie*, by F. Cramer; 4th ed., 214 pp. (99 ill., 109 tables); DM 21.—

The new edition of this book on paper chromatography is enlarged, but unchanged in arrangement. The general part discusses theory and techniques, the special part describes in detail most of the proved methods for the determination of amino acids, proteins, sugars, alcohols, phenols, organic acids, alkaloids, vitamins, antibiotics, steroids, dyes, etc.

Volk und Wissen Verlag, Berlin W 8: *Tabellenbuch Chemie*, by S. Otto et al.; 1956, 448 pp., DM 16.20.—A collection of tables for chemists, containing frequently used physical and chemical constants and other data concerning the elements and hundreds of their inorganic and organic compounds, also mathematical tables, formulas, etc.

Editio Cantor, Aulendorf i. Wuert.: *Der Aminosäuren-Haushalt des Menschen*, by D. Muetting; 1958, 167 pp.—A critical review of 763 publications, supplemented by the author's own investigations, forms the content of this most informative little book on the role played by the amino acids in health and sickness.

Govi-Verlag, Frankfurt a.M.: *Elektrochemische Tabellen*, by B. E. Conway; 1957, 379 pp.—This British author's tabular compilation of electrochemical data from hundreds of cited literature sources, with explanatory text, has been made available to German readers in this excellent translation.



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